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12-9-2013

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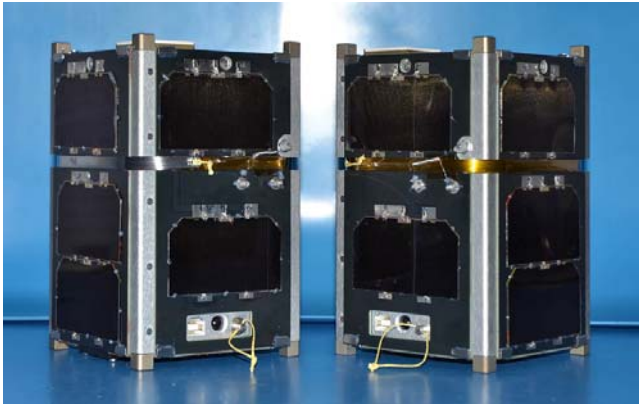
Sims, David, "UNH Scientists Launch “CubeSats” into Radiation Belts" (2013). *UNH Today*. 4387.
<https://scholars.unh.edu/news/4387>

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December 9, 2013

UNH Scientists Launch "CubeSats" into Radiation Belts



The twin FIREBIRD CubeSats. Photo courtesy of MSU Space Science and Engineering Laboratory.

DURHAM, N.H. – Twin, pint-sized satellites built in part at the University of New Hampshire's Space Science Center by UNH graduate student Alex Crew were launched into orbit from Vandenberg Air Force Base in California just before midnight on December 5, 2013.

The two 4x4x6-inch Focused Investigations of Relativistic Electron Burst Intensity, Range, and Dynamics (FIREBIRD) satellites will now brave a region of space 400 miles above Earth, where they have begun probing a mysterious physical process within our planet's dangerous radiation belts.

That process, known as microbursts, involves electrons moving at nearly the speed of light during short-duration (100 milliseconds) events. Microbursts are thought to be one of the primary mechanisms by which the outer radiation belt loses energetic particles to Earth's atmosphere after the occurrence of powerful solar storms. Such storms can dramatically change the intensity of the radiation belts.

"We care about this because the belts' high-energy particles, particularly the electrons, pose a real risk to spacecraft," says Crew, who worked on FIREBIRD for over three years to recently earn his Ph.D. "So if we understand these physical processes better, we'll be able to predict how the radiation belts will behave and both protect the satellites we depend upon for telecommunications, weather monitoring and prediction, etcetera, and design them to withstand this high-energy radiation," Crew adds.

FIREBIRD was among ten other CubeSats that shared a ride into space on a rocket dedicated to a larger mission—in this case, an Atlas 5 rocket launching a payload for the U.S. National Reconnaissance Office. Such ridesharing is standard operating procedure for a program designed to put small, low-cost satellites into space much more quickly than typical satellite missions.

The little satellites are placed into a compartment known as a Poly Picosatellite Orbital Deployer, P-POD for short, and jettisoned from the rocket at the proper orbital height above Earth. FIREBIRD was the first to be deployed and is the first CubeSat mission UNH scientists have been involved with.

Funded by the National Science Foundation (NSF), the CubeSat program is launching a new generation of tiny satellites outfitted with modern, smart-phone-like electronics and miniaturized scientific instruments to study highly focused science questions and go where bigger, more costly and complex satellite missions cannot.

"The tiny Firebird CubeSats are poised for big science discoveries, providing first-of-a-kind, multi-point observations of microbursts that will help answer crucial questions about radiation belt dynamics and processes," says Therese Moretto Jorgensen, program director in the NSF Division of Atmospheric and Geospace Science.

California Polytechnic State and Stanford universities first developed the CubeSat specifications in an effort to help universities worldwide perform space science and exploration, and NSF's program is providing students and young professionals with the opportunity to participate as never before in satellite missions end-to-end.

Crew's advisor and UNH mission lead scientist for FIREBIRD is astrophysicist Harlan Spence, director of the Institute for the Study of Earth, Oceans, and Space. Says Spence, "In contrast to typical satellite missions, which can take over a decade from conception to launch, the CubeSat program provides invaluable opportunities for scholars like Alex to experience a complete spacecraft mission and to conduct high-quality scientific research as a graduate student."

UNH and collaborators have already been funded for the follow-up FIREBIRD II mission slated for launch in October 2014.

Collaborators on FIREBIRD include Montana State University, the Aerospace Corporation, and the Los Alamos National Laboratory. Other key personnel at UNH who contributed to the mission include Jason Legere, Steve Longworth, Sonya Smith, and Mark Widholm. The lead scientist at Montana State University, research professor David Klumppar, is a UNH alumnus.

For more information on the FIREBIRD mission, visit: <http://firebird.unh.edu>

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 12,300 undergraduate and 2,200 graduate students.

Image to download: http://www.eos.unh.edu/newsimage/firebird_lg.jpg

Caption: The twin FIREBIRD CubeSats. Photo courtesy of MSU Space Science and Engineering Laboratory.

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